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ABSTRACT

This paper presents the results of a 1997-98 Goals 2000 Preservice Teacher Education Grant that created a partnership between the State University of New York at Oswego and two local elementary schools. The program was designed to provide preservice teachers in elementary education and special education methods classes the opportunity to observe expert teachers integrate technology in the elementary classroom through a video conferencing system and to experience the infusion of technology in their education courses. Grant activities were implemented during the 1997-98 academic year. Evaluation of these grant activities was conducted through pre- and posttest surveys, observation, and focus group interviews. Results summarize the impact of grant activities on faculty (n=20) technology proficiency and integration and preservice teachers' (n=61) technology proficiency and understanding of technology integration. Recommendations address program improvement, as well as methods that any department of education could utilize when attempting to prepare technology-using educators. (Author/AEF)

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Integrating, Infusing, Modeling: Preparing Technology Using Educators

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Abstract: This paper presents the results of a 1997-98 Goals 2000 Preservice Teacher Education Grant. The program was designed to provide preservice teachers the opportunity to observe expert teachers integrate technology in the elementary classroom through a video conferencing system and to experience the infusion of technology in their education courses. Grant activities were implemented during the 1997-98 academic year. Evaluation of these grant activities was conducted through pre/post surveys, observation, and focus group interviews. Results summarize the impact of grant activities on faculty (N=20) technology proficiency and integration and preservice teachers' (N=61) technology proficiency and understanding of technology integration. Recommendations address program improvement but also methods that any department of education could utilize when attempting to prepare technology-using educators.

Introduction

When I arrived as a new faculty member in the department of curriculum and instruction at SUNY Oswego in 1996, an educational technology course was being offered for the first time. However, most preservice teacher education students were not receiving any instruction on computer applications or integration methods since this newly developed technology course was not a program requirement and conflicted with most education courses. While it was planned to eventually require the technology course for education majors, several studies have concluded that a stand-alone course only develops basic computer skills and does not prepare educators to utilize technology in a variety of instructional settings. In addition, these studies have recommended the infusion of technology throughout education courses and the provision of technology-rich field placements so that preservice teachers observe and experience the modeling of technology integration in numerous settings (Handler & Pigott 1994; Office of Technology Assessment 1995; Wetzel 1993). Unfortunately, due to a lack of equipment and expertise within the department, faculty were unable to model technology use in their courses. Similarly, very few area K-12 classrooms were able to provide technology-rich field placements again due to a lack of equipment and teacher expertise.

In an attempt to jump start technology integration in teacher education, the department of curriculum and instruction developed a program to increase preservice teachers' proficiency in the integration of technology in their future classrooms by providing them with the opportunity to observe expert teachers integrate technology in the elementary classroom and to experience the infusion of technology in their education courses. Funded through a 1997-98 Goals 2000 Preservice Teacher Education Grant, this program created a partnership between SUNY Oswego and two local elementary schools. Primary goals of the grant were to:

- Create 6th grade and 4th grade model technology-using classrooms;
- Train faculty members and participating teachers on techniques of integrating technology;
- Provide faculty with 8 portable computer stations to enable technology infusion in education courses;
- Provide over 60 preservice teachers (enrolled in elementary teaching methods or special education methods) the opportunity to observe through video-conferencing/video technology-rich classrooms.

This paper describes the grant activities in detail as well as the impact these activities had on the education faculty and participating preservice teachers.

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Grant Activities

Grant activities were primarily implemented during the 1997-98 academic year. Grant directors were notified of funding in the spring semester of 1997, at which time equipment was ordered and a technology needs assessment was conducted for department faculty and participating teachers. This instrument gathered information on technology proficiencies, level of integration, perceived barriers to technology implementation, and training preferences. Using the needs assessment data, the project directors planned team meetings and training sessions for fall of 1997. Other grant activities during the fall included setting up equipment at the various sites and facilitating team development of technology integration activities to be implemented during the 1998 spring semester in both the participating elementary classrooms and the methods courses. Evaluation of the impact of these technology activities occurred throughout the semester. Description of all grant activities is presented below.

Acquisition of Technology

Since neither the participating classrooms nor the department of curriculum and instruction had the technology necessary for even basic integration activities in the classroom, a great deal of equipment was ordered for all participating sites. Each of the elementary classroom received: 5 desktop PCs, 1 laptop computer, 2 inkjet color printers, color scanner, LCD projector, and networking equipment. The department received 4 PCs (2 desktop and 2 laptops), 4 Macs (2 desktop and 2 laptops) , 8 inkjet color printers, 2 LCD projectors, color scanner, and video-conferencing equipment. Utilization of the video-conferencing system required lines to be installed in the two participating classrooms. Although installation of these lines was initiated at the onset of the grant, after 10 months of attempts the participating phone companies finally admitted that they were unable to provide the necessary lines due to the very rural location of the two sites.

Development of Teams

Two teams were developed to carry out the grant activities and to facilitate a comparison between an undergraduate elementary methods course and a graduate special education methods course. Project co-directors served as team leaders. The Elementary Team consisted of two instructors of the elementary methods course, a 6th grade teacher, and a project co-director. The two methods instructors had limited experience with integrating technology in the classroom and were concerned about the original course content taking a backseat to the focus on technology. One of the methods instructors was an Associate Professor while the other was a newly hired Assistant Professor. Approximately 25 students were enrolled in each methods section for the spring semester and had not taken an educational technology course. This methods course was structured such that students met two days a week for 6-7 hours. Students were in the field for the middle 9-10 weeks and were on campus the first four weeks and the last two weeks. Course content focused on planning, instruction, and evaluation methods in the elementary classroom. Since this course was held during the day, it was planned that students would have the opportunity to observe the 6th grade classroom utilizing a variety of technology applications via the video-conferencing system. The participating 6th grade teacher had recently completed his master's degree in educational technology and maintained a wealth of experience in teaching with technology. Twenty students were enrolled in his rural classroom. The project co-director that worked with this team was in her second year as an Assistant Professor, had moderate experience with technology integration, and was the principal investigator of the grant.

The Special Education Team consisted of one instructor of the graduate special education methods course, three 4th grade teachers, and a project co-director. Again, team members brought various levels of technology experience. The methods instructor was in her fourth year as Assistant Professor, was proficient in several areas of technology integration, and was eager to implement a variety of technology applications in her course. Only 11 graduate students were enrolled in her course and had not received a course on educational technology. This class was offered once a week in the evening and did not require a field placement. The participating 4th grade teachers had very limited experience using technology in the classroom. These teachers taught in an inclusion classroom with approximately 50 students. The project co-director who worked with this team was an Associate Professor and had minimal experience using technology.

Training & Technology Planning

Training on the following topics was provided to all department faculty and participating teachers during the fall of 1997: equipment basics, word processing, database, spreadsheet, Internet and email, content specific software, PowerPoint, HyperStudio, managing technology integration, and assistive technologies. Training topics

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were identified in the needs assessment. Sessions attempted to focus on integration methods not just basic skills.

As individuals attended training sessions throughout the fall semester, teams met on a regular basis to develop meaningful and complementary technology activities for their respective classrooms. Team leaders facilitated the scheduling of meetings as well as activity development. However, due to the composition and leadership differences in teams, the frequency of meetings as well as the process of developing technology activities greatly differed. Although the Elementary Team met frequently, development of all technology activities relied heavily on the 6th grade teacher and the team leader. In contrast, the Special Education Methods Team met only a few times during the fall semester and did not develop any technology activities for the 4th grade classroom or the methods course. Instead, the methods instructor independently developed technology-related course and occasionally sought assistance from the Elementary Team Leader.

Implementation

Elementary Team

In general, the Elementary Team experienced two setbacks that greatly influenced the implementation of meaningful technology activities: 1) the methods instructors relied heavily upon the classroom teacher and the Elementary Team Leader to generate and implement technology activities in their courses; and 2) preservice teachers were unable to observe via video conferencing the 6th grade classroom using technology since the phone companies were unable to provide this service. Unfortunately, this wasn't known until halfway through the implementation period, the spring semester. Consequently, technology integration was quite limited in the methods course. Preservice teachers observed through video two technology-related activities in the 6th grade classroom, one of which was reenacted with the preservice teachers. Other technology-related activities consisted of the classroom teacher presenting to the preservice teachers on technology integration ideas, sharing technology-rich lessons and student products, demonstrating several applications, and facilitating student hands-on time with the applications. Preservice teachers also had the opportunity to observe technology being used in their field placement; however most of the field placements demonstrated drill and practice and not tool-based applications.

The 6th grade classroom teacher implemented three technology-related units; each lasting several weeks. For language arts, students created a book review that consisted of a rating scale, a computer-generated illustration, and a word-processed book summary. The reviews were created using a teacher-made template and were on display in the school cafeteria for several weeks. During the 1998 Winter Olympics, students competed in the Mini-Metric Olympics for mathematics, in which game results were organized and computed using spreadsheets. For social studies, students created trading cards of historical figures in Modern Europe. Students utilized Encarta to gather information and created the trading card using a template developed by the teacher. All activities were shared with the methods students either through video and/or handouts.

Special Education Team

The Special Education Team was also limited by setbacks: 1) delayed arrival and configuration of equipment in the 4th grade classroom; and 2) a project co-director that did not schedule and/or facilitate team meetings. Consequently, the participating methods instructor and 4th grade teachers received inadequate support for activity development and implementation. Fortunately, the methods instructor was fairly comfortable in technology risk-taking and thus developed and implemented several technology activities on her own. This instructor demonstrated several technology applications and then required her students to develop lessons integrating technology. Students were also given the opportunity to explore many applications, especially assistive software. In addition, students were required to demonstrate various applications and conduct a poster session on technology-rich lessons. Since the 4th grade teachers were unable to implement any technology activities, the methods course observed through video the 6th grade classroom conducting the Mini-Metric Olympics.

Evaluation

Evaluation activities were conducted throughout the grant period. Pre/post surveys were administered to department faculty (May 1997, 1998), elementary teachers (May 1997, 1998), and preservice teachers (January & May 1998). Surveys measured technology proficiency, use/integration, perceived barriers, training preferences, and impact of grant activities. Training participants also completed evaluations. Observations were conducted of technology activities implemented in the college and elementary classroom. Focus group interviews were conducted with the participating preservice teachers at the conclusion of the grant. Group interviews consisted of 6-10 students and were conducted by the Elementary Team Leader and a trained graduate assistant at field sites and on campus.

Results

Department Faculty Proficiency and Integration

Since all department faculty had the opportunity to participate in the technology training sessions and utilize the 8 mobile computer units, a pre and post survey was administered to all department faculty to determine the impact of these activities on their technology proficiency and integration. Prior to the grant, the majority of faculty reported moderate/high proficiencies in general computer use, word processing, and email. After the grant, faculty reported significant increases in moderate/high proficiency in CD-ROM, distance learning, instructional software, Internet, and instructional methods. Faculty also reported an increase in integration of technology applications: computer presentations, instruction software, drawing, Internet, and word processing (See Table 2).

	C & I Faculty		Elem. Methods Students		Sp. Ed. Methods Students	
	PRE	POST	PRE	POST	PRE	POST
	n=18	n=15	n=48	n=37	n=11	n=10
Computer	88.9	93.3	87.2	86.1	92.9	90.0
CD-ROM	50.0	73.3	51.0	77.8	81.8	90.0
Distance ed.	16.7	46.6	4.2	8.6	0.0	30.0
Scanner	11.1	20.0	14.9	28.6	18.2	50.0
LCD panel	5.6	33.3	2.1	11.1	0.0	20.0
Word processing	94.4	100.0	97.9	94.4	100.0	100.0
Database	50.0	40.0	25.6	51.4	36.4	50.0
Spreadsheet	55.6	40.0	27.6	62.8	27.3	60.0
Drawing	22.2	13.4	25.5	42.9	63.7	80.0
Simulation	0.0	6.7	8.6	14.3	9.1	62.5
Instruction software	22.3	60.0	36.1	50.0	63.6	100.0
Presentation software	22.2	26.7	21.3	25.0	27.3	70.0
Hypermedia	16.7	13.4	31.9	52.8	45.5	80.0
Email	83.3	93.4	93.6	94.5	72.7	90.0
Internet	50.0	73.3	91.5	91.7	72.7	90.0
Instructional methods	27.8	46.7	19.1	36.1	45.5	90.0
Assistive technologies	N/A	N/A	10.6	8.3	0.0	60.0

Table 1: Percent Reporting Moderate to High Technology Proficiency (N/A = Not available)

Elementary Methods Students

Pre and post survey results revealed that preservice elementary teachers reported an increase in the following technology proficiencies: CD-ROM, database, spreadsheet, and hypermedia (See Table 1). These students also reported an increase in the applications they experienced and/or observed in their education courses: computer discussion group, content-specific software, distance education, drawing, spreadsheet, and word processing (See Table 2). Two methods, post survey and focus group interviews, were utilized to determine the impact of specific technology-related activities on students' understanding of a technology-rich classroom. The post survey asked students to rate the degree to which specific activities had an impact on their understanding of technology integration. The majority of students identified the following activities as having significantly contributed to their understanding: simulation of mini-metric Olympics (80.6%), classroom teacher's presentation of technology integration ideas (77.8%), viewing technology rich lesson plans and student products (69.4%), discussion of technology integration methods (61.1%), hands-on experience with various software packages (59.4%). The focus group interviews presented mixed results. Although the preservice teachers saw some benefit in the project in that it provided them with many technology integration ideas, the majority were very disappointed that the 6th grade observation was not done through the video-conferencing system as originally planned. Students perceived the technology focus as an "add-on" to the class that lacked connection to the course, its instructors, and its assignments. In addition, students maintained a vision of a technology-rich classroom as one that has "lots of computers for students to spend lots of time on them playing content-specific games and tutorials"—a scene that was depicted in over 70% of the of their field placements.

	C & I Faculty		Elem. Methods Students		Sp. Ed. Methods Students	
	PRE	POST	PRE	POST	PRE	POST
Computer presentations	16.7	60.0	63.8	77.7	72.2	100.0
Computer discussion group	16.7	26.6	44.7	69.4	27.3	70.0
Content specific software	16.7	46.6	42.6	68.4	18.2	90.0
Database	0.0	20.0	19.1	44.4	18.2	100.0
Distance education	0.0	6.0	2.1	38.8	0.0	30.0
Drawing	0.0	33.3	29.8	58.3	18.2	80.0
Email	61.1	73.3	97.9	94.4	36.4	80.0
Grading program	0.0	33.3	19.1	33.3	27.3	50.0
Home page development	5.6	13.3	38.3	36.1	0.0	10.0
Hypermedia	0.0	6.0	53.2	63.8	9.1	90.0
Internet	61.1	86.6	97.9	91.6	36.4	90.0
Scanner	5.6	13.3	21.3	38.8	9.1	40.0
Spreadsheet	11.1	20.0	29.8	75.0	0.0	70.0
Simulation	0.0	0.0	0.0	30.5	18.2	30.0
Word processing	50.0	93.3	78.7	94.4	54.4	100.0
Assistive Technologies	N/A	N/A	19.1	17.0	9.1	90.0

Table 2: Percent Reporting Experience and/or Observation of Instructor Using Applications in Courses (N/A = Not available)

Special Education Methods Students

Special education methods students reported significant increases in several computer-related proficiencies as well: distance education, scanner, LCD projector, spreadsheet, simulation, instruction software, presentation software, hypermedia, instructional methods, and assistive technologies (See Table 1). They also reported an increase in experiencing/observing all applications in education courses (See Table 2). These master's students felt that all technology-related activities increased their understanding of technology integration, but identified the following as having the strongest impact: poster sessions of technology-rich lessons (90%), PowerPoint demonstration by instructor (60%), process of developing a technology-rich lesson (60%). During the focus group interview, students saw the grant project as very positive and felt that the technology experiences were connected to the course content and assignments. They reported that the project provided many ideas and examples of technology integration that enabled them to advance their vision of technology-rich classroom from one in which computers are used for games and tutorials to one in which computers are used as a productivity tool.

Recommendations

Although the first year of this project may not have produced the kind of results we had hoped, a great deal was learned and improved upon for the second year of the project. The following recommendations address responsibilities for project directors, education faculty, and classroom teachers. While these improvements are specific to this project and are currently being implemented, they can also be viewed as general recommendations for school-university partnerships seeking to develop technology-using educators.

Project Directors

A difficulty in implementing this grant was holding participants, especially faculty members, accountable for assigned responsibilities. This may have been due to the disparity in rank between principal investigator and several of the faculty participants. To ensure that faculty participants fulfill their responsibilities, the principal investigator should clarify expectations of all participants—a process in which participants would identify personal objectives that are aligned with the project goals, develop a timeline for fulfilling those objectives, and periodically reflect upon and review with the director the achievement of objectives as well as the support they have received and

will need in the future.

One of the expectations of the participating faculty and teachers was that they would integrate technology in their instruction. Although training was provided, participants did not have the opportunity to observe technology-rich instruction in the college or elementary classroom. Consequently, several faculty members and teachers experienced difficulty in developing vision of a technology-rich classroom. In addition, the training sessions really provided participants with a smorgasbord of technology applications—most felt they learned "a little bit about a lot of stuff" but were just not comfortable yet with classroom integration. Therefore, to increase faculty and teachers' ability to integrate technology in their instruction, a training program should be designed that provides faculty and teachers with technology-rich site visits as well as facilitates proficiency in 2-3 personally selected technology applications and the development of classroom activities that utilize those applications. Essentially, faculty and teachers develop a personalized plan for integrating technology that identifies: 2-3 applications for proficiency development, a plan for developing target proficiencies, the type and number of technology activities to be implemented, a timeline for accomplishing objectives, and a plan for periodic review. The focus on only a select number of applications is supported by a study conducted by Vannatta (1998) in which she found that technology integration among education faculty was not highly correlated with overall proficiency in numerous applications but rather proficiency in instructional methods of integration and 2-3 applications.

Participating Faculty and Teachers

Although the special education methods instructor received minimal support from her Team Leader and members, she was able to implement numerous technology-related activities in her course that in turn had a very positive effect on her students' technology proficiency and their vision of a technology-rich classroom. The primary difference between the activities implemented in the special education methods course and the elementary methods course was the connectedness of the activities to the instructor, the course, and the assignments. In the special education methods course, the instructor herself implemented and modeled the technology activities throughout the semester. In addition, this instructor required her students to complete several assignments that integrated technology (e.g., develop lessons that integrate technology, review software, demonstrate different applications, share technology ideas). In contrast, activities implemented in the elementary methods course were primarily taught in isolation by the Team Leader and the 6th grade teacher. Furthermore, the methods instructors did not connect these activities to the course content or assignments; consequently students did not see the relevance in the technology activities but rather felt that the technology focus detracted from the course content necessary to complete assignments. Therefore, in order to improve the modeling of technology integration in education courses, faculty should: model technology integration themselves, require assignments that integrate technology, have students develop lessons that integrate technology, discuss technology integration throughout the course, discuss different uses of technology (tutorial vs. productivity), and provide opportunities for students to share technology-rich lessons with each other.

Recommendations for improving the technology integration among the participating classroom teachers are similar to those previously stated for the faculty. Essentially, allow teachers to develop a personal technology integration plan and have teachers visit the education courses to share their experiences with technology integration.

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